

Appl. No. 10/608,176

Amdt. Dated November 7, 2006

Reply to Office Action of September 7, 2006

**AMENDMENTS TO THE DRAWINGS**

The attached two sheets of drawings include changes to FIGS. 3 and 5. In FIGS. 3 and 5, previously omitted cross hatching has been added.

Attachment: 2 replacement sheets

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### REMARKS

This is a full and timely response to the final Office action mailed September 7, 2006. This response is filed within two months of the mailing date of the final Office Action. Reexamination and reconsideration in view of the foregoing amendments and following remarks is respectfully solicited.

Claims 1-24 are pending in this application, with claims 1 and 17 being the independent claims. Claims 25-26 have been withdrawn. No new matter is believed to have been added.

### Objections to the Drawings

In the office action, the Examiner objected to the drawings as not showing the proper hatchings in FIGS. 3 and 5. Specifically, the Examiner objected to a lack of proper hatching bearing cartridge 308. Applicants have attached replacement sheets that add additional cross hatching to the bearing cartridge 308 in these FIGS. Applicants thus submit that this objection has thus been overcome.

The Examiner also objected to the failure of the drawings to show lubricant designated with an appropriate referential numeral. Applicants respectfully disagree, and submit that the previous amendments to FIGS 3 added the illustration of grease 7 in the bearing 300. See the center of the bearing cartridge, where the grease 7 is illustrated as a heavy line around the balls 310. Applicants thus submit that this rejection has thus been overcome.

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### **Objections to the Disclosure**

The Examiner has objected to the disclosure for failure to designate the lubricant with a reference numeral. The Examiner noted that amended paragraph 0049 describes a grease 7 as an example of a lubricant, but stated that the drawings do not show referential character 7. Again, applicants disagree, and point the reference numeral 7 in the center of the bearings 300, where the reference number 7 indicates grease surrounding the balls 310. Applicants thus submit that this rejection has been overcome.

### **Rejections under 35 U.S.C. § 112**

Claims 12, 13 and 22 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. Specifically, the Examiner stated that the claims contain subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the art that the inventors, at the time the application was filed, had possession of the claimed invention. Specifically, the Examiner stated that claims 12, 13 and 22 recite selective control of the control voltage to distribute lubrication in the bearing, but then stated that the drawings do not show the lubrication, the lubrication reservoir, lubrication conduits, etc., and how lubricant is distributed in the bearing. The Examiner further alleged that it was unclear as to how the control system controls the voltage to distribute the lubrication in the bearings as claimed.

In the previous response, applicants argued that the claims met the requirements of 35 U.S.C. § 112, citing paragraphs 0049-0051 of the specification. In response to applicant's arguments, the Examiner has restated the rejection, stating the paragraphs 0049-0051 do not describe how the adjusting of the preload during operation causes the redistribution. Applicants disagree, and again submit that claims 12, 13 and 22 meet the written description requirement of 35 U.S.C. § 112, first paragraph. Applicants submit that the specification adequately describes how the recited preload adjustment device

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could be used to distribute lubrication in the bearing. Again, paragraphs 0049-0051 describe how the bearings can be filled with a lubricant such as grease, and how by applying a high frequency control signal, the preload spacer will provide a high frequency vibration that will assist in redistributing lubrication in the bearings. **To restate, 1) a high frequency control signal is provided to the preload spacer, 2) the high frequency control signal causes the preload spacer to vibrate at a high frequency, 3) this high frequency vibration is transferred to the adjacent bearing, where it causes a vibration in the bearing that helps cause lubrication in the bearings to redistribute throughout the bearing.** This is all clearly described in paragraphs 0049-0051 of applicant's specification. Applicants again note that such a system is able to facilitate redistribution of lubrication without requiring any specific configuration of lubrication reservoir and/or conduits. As such, no detailed description or illustration of a lubrication reservoir and/or conduits is required.

Applicants thus submit claims 12, 13 and 22 meet the written description requirement. Applicants thus request that the rejections under 35 U.S.C. § 112, first paragraph, be withdrawn.

**Rejections under 35 U.S.C. § 102 and 103**

Claims 1-5, 7, 8, 17-21, 23 and 24 were rejected under 35 U.S.C. § 102(b) as being anticipated by Perni et al (E.P. Patent No. 1,134,443), hereinafter "Perni". Claims 1 and 9-16 were rejected under 35 U.S.C. § 102(b) as being anticipated by Kudo et al (U.S. Patent No. 6,286,374), hereinafter "Kudo". Claims 1-5, 7-11, 14-21, 23 and 24 were rejected under 35 U.S.C. § 102(e) as being anticipated by Fleury et al (U.S. Patent No. 6,505,968), hereinafter "Fleury". Claims 12, 13 and 22 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Fleury in view of Karamata (U.S. Patent No. 6,505,968), hereinafter "Karamata". Claims 1 and 17 were rejected under 35 U.S.C. §

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102(e) as being anticipated by Wu et al (U.S. Patent No. 6,522,757), hereinafter "Wu"). Again, applicants respectfully disagree. Claims 1 and 17 were rejected under 35 U.S.C. § 102(e) as being anticipated by Moseley et al (U.S. Patent No. 4,850,719), hereinafter "Moseley"). Claim 1 was rejected under 35 U.S.C. § 102(e) as being anticipated by Golz et al (EP. Patent No. 0 377 145), hereinafter "Golz"). Applicants submit that all of these rejections are improper for the same reason, that is, none of these references disclose the use of a preload adjustment device that includes a piezodynamic preload adjustment spacer coupled to a bearing in a "momentum control device".

Specifically, with regard to Perni, applicants again submit that the Perni reference fails to disclose a piezodynamic preload adjustment spacer coupled to a bearing in a "momentum control device", "control moment gyroscope", or "reaction wheel" as the terms are used in the specification and claims. Applicants' specification defines "momentum control devices" as devices used to controllably impart torque. They are commonly used on space vehicles for attitude control. The specification describes two specific types of momentum control devices, reaction wheels and control moment gyroscopes. See paragraphs 0002 -0004 of applicants' specification. See also claims 7 and 8, which specifically recite reaction wheels and control moment gyroscopes. Applicants note that both reaction wheels and control moment gyroscopes are known control devices. See [http://en.wikipedia.org/wiki/Control\\_Moment\\_Gyroscope](http://en.wikipedia.org/wiki/Control_Moment_Gyroscope) and [http://en.wikipedia.org/wiki/Reaction\\_wheels](http://en.wikipedia.org/wiki/Reaction_wheels) for background information on reaction wheels and control moment gyroscopes.

In the final office action, the Examiner has again rejected these arguments. In maintaining this rejection, the Examiner stated that a rigid body is subjected to angular momentum when it rotates about its axis. The Examiner then stated that since Perni's

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device is for measuring and adjusting preload on bearings, and since it is inherently subjected to angular momentum, that it "reads on" the claimed "momentum device".

Applicants respectfully disagree, and again submit that Perni fails to teach a "momentum control device" as claimed, and thus fails to meet all the claimed limitations. First, applicants note that the Examiner specifically cites element 2 of FIG. 1 in Perni as being a momentum control device. Applicants disagree, and note that element 2 of Perni is described as an "actuator device". Furthermore, applicants note that element 2 is not described as "rotating" in any way that could create angular momentum. Finally, applicants submit even if element 2 was rotated, it would not qualify as a momentum control device as the term is defined and used in the specification.

In supporting this rejection the Examiner appears to rely on the theory that since any device device (i.e., element 2 of Perni) is subjected to angular momentum when it rotates about an axis, then element 2 of Perni is a momentum control device. Applicants again disagree. First, applicants note that a momentum control device is not just "subjected to angular momentum" as alleged by the Examiner. Instead, momentum control devices **controllably impart torque** to a vehicle. See applicants' specification at paragraphs 0002-0004. Thus, just because a device could be rotated to generate angular momentum it cannot be considered to be a "momentum control device" because by itself it **cannot controllably impart momentum**. For example, there is no explanation in Perni of how any rotor could be controllably rotated to provide a desired amount of torque on a vehicle.

Furthermore, even if the Examiner were correct that any rotating device could be considered a "momentum control device", it could not be similarly said that any rotating device is a **reaction wheel** or a **control moment gyroscope**, the two specific types of



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momentum control devices recited in the claims 7 and 8. With regard to these claims, the final rejection states: "Regarding claim 7, the momentum control device 2 comprises a reaction wheel 2 (Fig. 1)." And "Regarding claim 8, the momentum control device 2 comprises a control moment gyroscope 2". Besides being contradictory, these statements are completely without support in the Perni reference. In fact, the Perni reference does not even contain the words "wheel" or "gyroscope". Thus, there is no teaching in Perni of any "momentum control device" in general, or "reaction wheel" or "control moment gyroscope" in the specific. Thus, applicants submit that the Examiner must withdraw the rejections to claims 7 and 8 based on the Perni reference for these reasons alone.

Thus, applicants submit that independent claims 1 and 17 are patentably distinct over the cited Perni reference. Furthermore, as the various dependent claims depend from, and include all the limitations of their respective independent claims, they are also submitted to be patentably distinct.

With regard to the rejection based on Kudo, applicants again respectfully disagree, and submit that independent claims 1 and 17 are patentably distinct over the cited Kudo reference for the same reasons. In the previous response, applicants argued that Kudo failed to disclose a piezodynamic damping spacer is coupled to a bearing in a "momentum control device" as the term is defined in the specification and claims. As with the Perni reference discussed above, the Examiner did not attempt to assert that Kudo teaches a "momentum control device" as claimed. Instead, the Examiner cites a physics text book, and notes that a rigid body is subjected to angular momentum when it rotates about its axis. The Examiner then states that since Kudo's device is for measuring and adjusting preload on bearings, and since it is inherently subjected to angular momentum, that it "reads on" the claimed "momentum device".

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Applicants again respectfully disagree, and submit that Kudo fails to teach a momentum control device for similar reasons as given above with respect to Perni. As stated previously, applicants' specification defines momentum control devices as devices commonly used to impart torque and provide attitude control on spacecraft and other vehicles, with reaction wheels and gyroscopes being two primary examples. The Kudo device is not a reaction wheel, a control moment gyroscope or any other type of momentum control device.

Likewise, applicants again submit that Fleury, Karamata, Wu, Moseley, and Golz all fail to disclose a reaction wheel, a control moment gyroscope, or any other type of momentum control device, as the term is defined in the specification and used in the claims. As such, they do not meet the claimed limitations of a "piezodynamic preload spacer coupled to a bearing in a momentum control device", and as such, the pending claims remain patentably distinct over the cited references.

Applicants thus submit that independent claims 1 and 17 are patentably distinct over the cited references. Furthermore, in addition to the dependent claims discussed above, the other dependent claims include many other features not found in the cited references. With regard to claims 9, 10, 11, 14, 15, 16, 19, 20, 22, 23, and 24 the cited references do not disclose the selective use of a control voltage to compensate for changes in operating environment of a momentum control device, for wear in the bearing of a momentum control device, to compensate for thermal expansion in the bearing of a momentum control device, or to adjust the preload during the launch of a momentum control device.



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In summary, none of the references cited by the Examiner nor any other known prior art, either alone or in combination, disclose the unique combination of features disclosed in applicant's claims presently on file. For this reason, allowance of all of applicant's claims is respectfully solicited.

Although the Examiner noted that the claims were not identical, the Examiner stated they were not patentably distinct. Applicants continue to disagree, but note that the claims of copending Application No. 10/608,174 have not yet been allowed, and that this remains a provisional rejection.

#### Conclusion

Based on the above, independent claims 1 and 17 are patentable over the citations of record. The dependent claims are also deemed patentable for the reasons given above with respect to the independent claims and because each recite features which are patentable in its own right. Individual consideration of the dependent claims is respectfully solicited.

The other art of record is also not understood to disclose or suggest the inventive concept of the present invention as defined by the claims. Hence, applicants submit that the present application is in condition for allowance. Favorable reconsideration and withdrawal of the objections and rejections set forth in the above-noted Office action, and an early Notice of Allowance are requested.

If the Examiner has any comments or suggestions that could place this application in even better form, the Examiner is requested to telephone the undersigned attorney at the below-listed number.

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If for some reason Applicants have not paid a sufficient fee for this response, please consider this as authorization to charge Ingrassia, Fisher & Lorenz, Deposit Account No. 50-2091 for any fee which may be due.

Respectfully submitted,

INGRASSIA FISHER & LORENZ

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